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Does safety climate predict safety performance in Italy and the USA? Cross-cultural validation of a theoretical model of safety climate

Claudio Barbaranelli [a,*], Laura Petitta [a], Tahira M. Probst [b]

[a] Sapienza – Università di Roma, Italy
[b] Washington State University Vancouver, United States

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ABSTRACT

Previous studies have acknowledged the relevance of assessing the measurement equivalence of safety related measures across different groups, and demonstrating whether the existence of disparities in safety perceptions might impair direct group comparisons. The Griffin and Neal (2000) model of safety climate, and the accompanying measure (Neal et al. [NGH], 2000), are both widely cited and utilized. Yet neither the model in its entirety nor the measure have been previously validated across different national contexts. The current study is the first to examine the NGH measurement equivalence by testing whether their model of safety climate predicting safety performance is tenable in both English speaking and non-English speaking countries. The study involved 616 employees from 21 organizations in the US, and 738 employees from 20 organizations in Italy. A multi-group confirmatory factor analytic approach was used to assess the equivalence of the measures across the two countries. Similarly, the structural model of relations among the NGH variables was examined in order to demonstrate its cross-country invariance. Results substantially support strict invariance across groups for the NGH safety scales. Moreover, the invariance across countries is also demonstrated for the effects of safety climate on safety knowledge and motivation, which in turn positively relate to both compliance and participation. Our findings have relevant theoretical implications by establishing measurement and relational equivalence of the NGH model. Practical implications are discussed for managers and practitioners dealing with multi-national organizational contexts. Future research should continue to investigate potential differences in safety related perceptions across additional non-English speaking countries.

1. Introduction

First introduced by Zohar in 1980, safety climate has since proved to be a crucial construct for the study of variables linked to accidents and injuries in the workplace. Numerous studies have been devoted to the measurement of safety climate and identifying its pertinent components, as well as articulating the nomological network of its antecedents and consequences related to safety performance and safety outcomes. As noted by Zohar (2014), there have been two primary approaches to the measurement of safety climate. One approach has been to develop industry- and sometimes organization-specific measures of safety climate adapted to the unique features of the organizational and/or industrial context (see Dedobbeleer and Beland, 1991 and Singer et al., 2007 for examples). A second approach has favored the development of universal or general measures of organizational safety climate for use regardless of the specific organizational context (e.g., Neal et al., 2000; Griffin and Neal, 2000). While the former approach necessitates the development and validation of climate measures in each new context, the latter offers the possibility of accruing knowledge regarding the antecedents and consequences of safety climate across multiple contexts, languages, and cultures. In order to do so, however, there must first be ample evidence that the meaning and measurement of safety climate is equivalent across these disparate contexts.

The purpose of the current study was to assess the measurement equivalence of a widely-used universal measure of safety climate developed by Neal et al., 2000 (NGH, 2000)Neal et al., 2000 (NGH, 2000) and to provide a cross-cultural validation of their proposed broader theoretical model of safety climate (Griffin and Neal, 2000). Despite the appeal and broad use of their measure, nearly all of the published studies using this scale and/or testing their model has been conducted in Anglo English-speaking countries such the US, UK, Australia, and Canada. Therefore, comparative studies are needed to determine whether the

* Corresponding author at: Department of Psychology, Sapienza University of Rome, Via dei Marsi, 78, 00185, Rome, Italy. Tel.: +39 06 49917623.
E-mail address: claudio.barbaranelli@uniroma1.it (C. Barbaranelli).

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meaning of safety climate, as well as its causes and determinants are invariant across English and non-English speaking countries and non-Anglo cultural contexts.

As noted by Jorgensen et al. (2007), the preponderance of studies from homogenous cultural contexts and in the English language raises the issue of the cross-cultural validity of the NGH safety climate scale and its associated theoretical model. This question may have a crucial impact in the study of safety climate in different cultural contexts, as the comparison of responses to safety climate measures obtained in distinct countries can be compared only if workers from these countries hold qualitatively as well as quantitatively similar (if not identical) views of the constructs that are being compared. Specifically, workers from different countries must have an identical frame of reference (thus, holding a qualitatively identical view of safety climate) as well as use the same response scale when responding to safety climate questionnaire items (thus, holding a quantitatively identical view of safety climate). This concept of measurement equivalence (ME, Meredith, 1993) is a prerequisite for comparing constructs between groups of workers from different countries. As we will discuss, different levels of ME calls for the comparison of different parameters (e.g., factor loadings, path coefficients, etc.) across the groups.

In the present study, our goal was to systematically compare perceptions of safety climate, as well as related concepts, from workers in two different countries in terms of ME. More specifically, we aimed at investigating the extent to which workers in two very different countries such as Italy and the US differ in how they interpret and respond to the NGH multidimensional measure of safety climate, safety performance components and safety performance determinants. The following sections present a brief review of the concept and measurement of safety climate, focusing especially on the Griffin and Neal model and the role of sociocultural differences in potentially affecting measurement equivalence across cultures and/or languages. Next, we discuss the issue of ME and its relationship to safety climate assessment in cross-cultural safety studies.

1.1. Safety climate

Organizational climate has traditionally been viewed as a set of underlying values, beliefs, and principles that employees perceive are held within their organization. These perceptions serve as a frame of reference for employees to guide adaptive work behavior by providing cues regarding expected behavior–outcome contingencies (Schneider, 1975). Zohar (1980) first defined the concept of organizational safety climate as "a unified set of cognitions [held by workers] regarding the safety aspects of their organization" (p. 101). Since Zohar's seminal article, research has shown that there are a number of dimensions that are important to consider when conceptualizing and measuring safety climate including management values (i.e., the extent to which management places a high priority on safety), safety communication (i.e., the extent to which there is an open exchange of information regarding safety), safety training (i.e., the extent to which training is accessible, relevant, and comprehensive), and safety systems (i.e., the extent to which safety procedures are perceived to be effective in preventing accidents; Griffin and Neal, 2000).

In 2000, Neal, Griffin, and Hart developed and validated a measure of safety climate, finding support for their multidimensional conceptualization of safety climate. Moreover, Griffin and Neal (2000) proposed and tested a comprehensive conceptual framework tying together the nomological network of the antecedent and consequent variables related to safety climate. Specifically, they found that safety climate was predictive of employee safety knowledge and safety motivation. While safety knowledge is required to understand the appropriate ways of behaving safely, safety motivation refers to an individual's willingness to do so and the valence associated with that behavior. They proposed that motivation and knowledge in turn mediated the effects of safety climate on safety performance, which was comprised of two distinct components: safety compliance and safety participation. Whereas safety compliance concerns adherence to explicitly stated safety rules and regulations, safety participation reflects safety-related organizational citizenship behaviors (e.g., going above and beyond to proactively promote safety within the workplace).

Since then, numerous studies have been conducted on the relationship between safety climate and employee safety outcomes with three recent meta-analyses (Beuset al., 2010; Christian et al., 2009; Clarke, 2006) demonstrating consistent relationships with safety knowledge, motivation, compliance, participation, and employee injuries. Initial research (Probst and Estrada, 2010) also suggests that safety climate is predictive of employee accident under-reporting (e.g., failure to report an experienced workplace injury or accident to the appropriate company officials).

Thus, a growing body of literature provides support for the Griffin and Neal (2000) conceptual model of safety climate and employee safety attitudes, behaviors, and outcomes (see Christian et al., 2009 for a meta-analytic test of the model). Nevertheless, there are some important limitations associated with the extant body of literature. First, very little of the research has explicitly tested the Griffin and Neal model in its entirety (see Neal et al., 2000, and Neal and Griffin, 2006; for exceptions). More importantly, even expanding to include those studies which test portions of the proposed Griffin and Neal theoretical model, the vast majority of research has been conducted in English-speaking countries with an Anglo-cultural background (e.g., England, Australia, Canada, and the United States). For example, in the Christian et al. (2009) meta-analytic path model test of the Griffin and Neal theoretical model, approximately 80% of the studies were from the above countries with an additional 7% stemming from Israel. Second, and equally important, there have been no published attempts to evaluate the extent to which the increasingly-utilized NGH (2000) measure of safety climate is invariant across languages and/or cultural settings.

Thus, it remains an empirical question as to whether the meaning of safety climate as perceived by employees differs across language or culture, let alone whether the oft-observed relationships with safety climate are invariant across different cultural settings. Indeed, in a test in an Asian cultural setting of a different safety climate model developed by Cheyne et al. (1998),Bahari and Clarke (2013) could not replicate the predicted factorial structure of safety climate, thus failing to find evidence for the prerequisite of configural invariance needed for measurement invariance. Below we discuss in further detail the potentially important role of sociocultural and language differences in measuring and testing hypotheses regarding safety climate and employee safety outcomes, particularly in the two focal countries of interest in the current study: Italy and the United States.

1.2. Role of culture and language in safety climate literature

At first glance, there would appear to be some similarity between the United States and Italy with respect to safety. For example, in 2008, the rate of Italian workplace accidents was 3.7 cases for every 100 full-time equivalent (FTE) workers, resulting in a socio-economic cost of approximately $58 billion representing 2.8% of the gross domestic product (Eurispes, 2010). During that same period, the United States experienced a similar rate of workplace accidents at 3.9 cases for every 100 employees. Estimates suggest the costs associated with workplace injuries in the US are nearly $189 billion in lost wages and productivity, medical costs, and